

Appln No. 10/079,293

Amdt date February 2, 2004

Reply to Office action of November 3, 2003

Amendments to the Specification:

On page 5, delete the first three paragraphs beginning on line 3, through line 25, and replace it with the following:

The cutting elements or cutters of the present invention have a body 110 with a canted cutting face forming interface 112 (FIG. 5A). Stated differently, the interface is sloped. An ultra hard material layer 114 is formed over the canted interface. The upper surface 124 of the ultra hard material layer typically remains flat such that the thickness of the ultra hard material layer is minimum adjacent the highest point 128 on the interface and maximum adjacent the lowest point 126 on the canted face. Alternatively, the upper surface of the ultra hard material layer is dome-shaped (FIG. 5B). However, the radius of the dome-shaped surface is preferably relatively large such that the thickness of the ultra hard material layer is still maximum adjacent the lowest point 126 on the canted face. Preferably, the thinnest portion 133 of the ultra hard material layer should be in the order of 10-20% of the thickness of the thickest portion 134.

The overall length of the cutter of the present invention remains the same as that of a conventional cutter allowing for mounting into existing bit bodies. The cutter body outer surface longest length 130 as measured from the highest point ~~[[126]]~~ 128 on the interface is the same or longer than the length of conventional cutter bodies. The length of the cutter along the lowest point of the interface is less than or equal to the length of conventional cutter bodies.

The cutters are mounted in the preformed openings 22 having a rear support wall 23 on the bit body 18 with the longest portion of the cutter outer surface ~~[[132]]~~ 130 facing the rear support wall such that it becomes the surface of the cutter that is brazed to the bit body (FIG. 6). In other words, the longest cutter surface ~~[[132]]~~ 130 is within the cutter critical braze area. Since the longest outer surface of the cutter is the same or longer than the outer surface of conventional cutters, the cutter brazing critical area remains almost the same as the brazing critical area of conventional cutters. However, in comparison to conventional cutters with increased thickness ultra hard material layers, the overall brazing area on the cutter body is increased.

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On page 6, delete the paragraph beginning on line 14 through line 24, and replace it with the following:

In a first embodiment, the canted interface is planar as shown (FIG. 5A). In another embodiment the canted face is formed by a series of steps 140 along the interface (FIG. 7A). These steps ascend from a first point 126 to a second point 128 on the interface. These steps include an upper surface 141 and a riser 143. The upper surface 141 of these steps may be flat (FIG. 7A) or canted (i.e., sloped) themselves (FIG. 7B). The upper surface of the steps may also be curved (FIG. 7C). In further embodiments, the steps 140 may have upper surfaces 142 which are non-uniform (FIG. 7D). Of course, as is apparent to one skilled in the art, the steps themselves form a non-uniform face for interfacing with the cutting layer or with a transition layer. The steps may zig zag across the interface (FIG. 8A), or they may curve towards the lower edge 126 of the canted face (FIG. 8B) or toward the higher edge 128 of the canted face (FIG. 8C) forming horseshoe shapes or may be linear (FIG. 8D) across the canted interface.

On page 8, before the third full paragraph which begins on line 14, please insert the following paragraph:

Moreover, as can be seen in the exemplary embodiments shown in FIGS. 8A-8D and 11A-11C, the interface surface of such cutters, are symmetric about a plane. With some exemplary embodiment cutters, as for example shown in FIGS. 7A-7C, 9A-9C and 10A-10C, the ultra hard material layer thickness is at a maximum and at a minimum along this plane.

On page 8, delete the paragraph beginning on line 14, through line 22, and replace it with the following:

While there are many ways to form the body of cutter having a canted surface, one method calls for the formation of a cylindrical work piece 150 having a dome shaped (or convex) upper protrusion 152 (FIG. 13A). The work piece should have a diameter ~~[[154]]~~ 160 twice the diameter of the desired cutter body. To form the cylindrical cutter body having the canted

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interface, preferably EDM is used to cut the cutter body tangential to the central axis 156 of the cylindrical work piece and tangential to the outer surface 158 of the cylindrical work piece. (FIG. 13B). In a preferred embodiment, two cutter bodies may be cut simultaneously which are tangential along the work piece central axis 156 and which have their central axes 162 along a diameter 160 of the work piece as shown in FIG. 13B